

## Observations on the Distribution, Habitat, and Seasonality of the Centiped *Scolopocryptops sexspinosus* (Say) in Virginia (Scolopendromorpha: Cryptopidae)

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### ABSTRACT

*Scolopocryptops sexspinosus* is a common, widespread centiped in Virginia, occurring from sea level to the highest mountain in the state. It exhibits local habitat preferences, such as occupying hardwood forests to the near exclusion of pine plantations, mature hardwoods as opposed to old growth forests, and coastal mesic and dune habitats in favor of maritime scrub. Adults are active throughout the year with peak captures statewide recorded during July and September. Differences in seasonal activity patterns between populations are apparent, presumably due to variation in elevation and climate (temperature). Seasonal activity may also vary within populations, likely as a result of local moisture differences. Pitfall trapping is an effective technique for capturing this large, formidable species in numbers.

*Key words:* centiped, Chilopoda, Virginia, distribution, habitat, seasonal activity.

### INTRODUCTION

*Scolopocryptops sexspinosus* (Say) is Virginia's largest centiped and perhaps the one most often seen by humans. It is a species of leaf litter and rotting logs, with old adults attaining lengths of 65 mm (2.6 inches). The color is somewhat variable, but typically orange to orange-red, rarely reddish-brown. The species is blind (lacks ocelli), possesses 23 pairs of legs, and can deliver a painful bite if handled (Shelley, 1987). During the summer months, brooding females are often discovered under bark or in damp rotting wood (Shelley, 2002), coiled about their eggs or recently hatched young, which they protect from potential predators, and possibly also fungal growth (Auerbach, 1951). Females attending up

to 65 embryos were reported by Auerbach (1951), who noted that prey consists of insects, earthworms, spiders, and smaller centipeds.

Despite its large size and virtual ubiquity over much of eastern North America, very little has been published about the general biology of *S. sexspinosus*. The few published notations are generally no more than anecdotal observations made during field work; so far nothing quantitative has appeared. Most museum material consists of single individuals picked up by people primarily interested in other taxa; extensive series are exceptional. This species is far more common than museum records imply, perhaps because collectors not equipped with forceps are reluctant to attempt hand-capture of these swift-moving centipeds that are capable of inflicting a painful bite.

Pitfall trapping is an extremely effective way to obtain

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\*Deceased

*S. sexspinosus* in quantity, and the widespread use of this technique in Virginia in recent decades provided the materials necessary to examine such aspects of its biology as distribution, seasonality, and habitat preference.

#### MATERIALS AND METHODS

Distributional and seasonal data are available for 676 Virginia specimens of *S. sexspinosus*, and associated habitat data exists for about half that number. The majority is housed in the Virginia Museum of Natural History, and represents extensive series obtained by the use of pitfall traps in various patterns (usually two to four buckets in each drift fence-pitfall array) typically operated on a monthly pickup basis, although in some sites specimens were collected at two-week intervals. These traps were operated by staff of the Virginia Museum of Natural History, personnel of the Virginia Department of Conservation and Recreation, Division of Natural Heritage (VDNH), and individual investigators, among whom Dr. Joseph C. Mitchell is particularly noteworthy. Additionally, Dr. Rowland M. Shelley of the North Carolina State Museum of Natural Sciences generously provided RLH with an extensive list of Virginia specimens of *S. sexspinosus* examined by him in many American museums.

#### CHOROLOGY

*Scolopocryptops sexspinosus* is generally distributed over much of eastern North America (Shelley, 2002; Fig. 1, inset map), from the Gulf Coast to southern Canada

(known only from Niagara Gorge, Ontario; Shelley, 1992). It occurs as high as 6400 ft/1950 m on Waterrock Knob in western North Carolina. This ubiquity is reflected in the narrower context of Virginia (Fig. 1), with captures made from sea level to the Fraser fir (*Abies fraseri*) forest on Mount Rogers at more than 5700 ft/1740 m. An earlier account (Hoffman, 1995) noted the lack of records for *S. sexspinosus* from the two Eastern Shore counties, but we subsequently collected this species at the Savage Neck Dunes Natural Area Preserve near Eastville in Northampton County.

The statement by Shelley (1987: 507) that "In any part of North Carolina, urban or rural, one can hardly spend 15 minutes sifting through litter or turning over logs without encountering one of these centipedes" applies precisely to the situation in Virginia. The species is surely statewide, and undoubtedly occurs in every county and city with the possible exception of the Dismal Swamp area in Suffolk and Chesapeake cities, and in most of adjoining Virginia Beach. That this lacuna may be real, rather than a collection bias, is suggested by a corresponding blank space in adjacent northeastern North Carolina (Shelley, 1987, fig. 15).

#### HABITAT

Previous reports concerning the preferred habitat of *S. sexspinosus* seem to be contradictory. In Illinois, the species was found in late winter in decayed logs, under bark, and in soil, whereas it was only collected in soil during summer (Auerbach, 1949). This centipede is usually difficult to find, occupying moist, inaccessible habitats

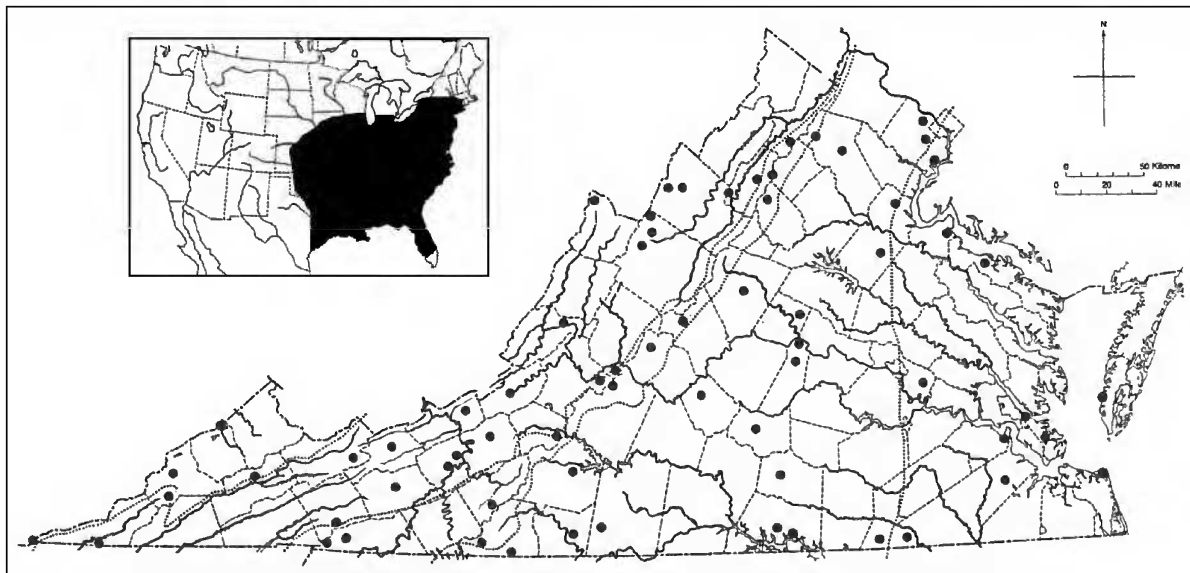


Fig. 1. Distribution of *Scolopocryptops sexspinosus* in Virginia. Inset map is based on Shelley (2002).

such as deep within rotting logs or stumps, but during the breeding season or after prolonged rains, it may be common under pieces of wood or bark, leaf litter, and rotting logs (Auerbach, 1951). Perhaps owing to its large size, Auerbach found that *S. sexspinosus* was more tolerant of desiccation than the other species of centipeds he tested. In Kentucky, *S. sexspinosus* was common under rotting logs (Branson & Batch, 1967; n = 16 captures), whereas it was collected exclusively in leaf litter in upland habitats in Illinois (Summers & Uetz, 1979; all 20 captures in pitfall traps). All specimens (n = 63) found by Lee (1980) in Ohio were under the bark of dead trees (i.e., none were taken in leaf litter), with most (80%) captured in deciduous forests (oak, maple, beech, hickory) and the remainder (20%) in coniferous forests. This centipede occurs statewide in North Carolina, where it is usually found in moist litter (deciduous or pine), but some individuals are also observed under rocks and logs (hardwood or pine), though rarely under the bark of decaying logs (Shelley, 1987).

In Virginia, *S. sexspinosus* occurs in a wide variety of habitats: under large stones (rarely), in leaf litter and detritus, and most frequently inside rotting logs in mixed mesophytic forests (RLH, pers. obs). It is rarely found under loose bark of downed trees unless on a damp, rotting log. The frequency of pitfall captures implies that it must be very surface active, but RLH has never seen one exposed on the surface either during the day or night despite more than 60 years of night collecting for salamanders and millipeds! And we have no records for its entry into houses or biting anyone, in contrast to the similar-sized *Hemiscolopendra marginata* (Say), which only rarely is caught in pitfalls but frequently invades homes and bites the occupants without provocation (Hoffman, 1994).

Despite the apparent catholicity of habitat selection by *S. sexspinosus*, collection data from several sites in Virginia demonstrate that under some local conditions, habitat preferences are clearly evident. The following examples are instructive:

#### First Landing (formerly Seashore) State Park

At this park, located at Cape Henry, City of Virginia Beach, VDNH operated pitfall-drift fence arrays for a 15-month period (March 1989-May 1990) in three different habitats. Captures of *S. sexspinosus* indicated preference for mesic habitats and a near-total avoidance of scrub (Fig. 2;  $X^2 = 65.44$ ,  $P < 0.001$ ). The general facies of the three habitats are as follows (abstracted from Buhlmann et al., 1993):

“Mesic site”: A natural, pristine forested tract dominated by oaks (*Quercus* spp.), loblolly pine (*Pinus*

*taeda*), red maple (*Acer rubrum*), and black gum (*Nyssa sylvatica*); the ground is often saturated and remains wet nearly year-round.

“Dune site”: an upland forest of mixed oaks and loblolly pine on an old dune ridge; about 100 m from the nearest standing water.

“Scrub site”: located in upland sandy ridges with forest cover of bluejack oak (*Quercus incana*) and loblolly pine and understory of blueberry (*Vaccinium* sp.); nearest standing water about 100 m distant.

Of the 129 specimens trapped at these sites, 80 (62%) were from the mesic site, 44 (34%) from the dune site, and only five (4%) from the scrub. Clearly, some unidentified constraints are present in this last habitat, although nothing different is evident from the brief site descriptions except for the occurrence of an ericaceous understory. Perhaps these plants reflect a lower soil pH to which the centipeds are sensitive. Habitat selection could be investigated by giving captive specimens a choice of several substrates identical except for one variable, such as soil pH, temperature, moisture, etc.

#### Cumberland County

From September 1989 through September 1990, J. C. Mitchell conducted pitfall trapping at several localities in the northern end of Cumberland County, Virginia, just south of the James River at Columbia in the central Piedmont region of the state (see Hoffman et al., 2012). Duplicate pitfall arrays were placed in two of three habitats:

a. Relatively undisturbed mature hardwood stands, composed largely of red maple, tulip poplar (*Liriodendron tulipifera*), white oak (*Quercus alba*), American beech (*Fagus grandifolia*), and sweetgum (*Liquidambar styraciflua*).

b. Old field communities in early successional stages, three to six years following clearcut lumbering, completely without canopy, with a ground cover of grasses, forbs, vines, shrubs, and planted seedlings of loblolly pine.

c. A pinewoods stand composed almost entirely of planted loblolly pine with an understory of dogwood (*Cornus florida*) and thick groundcover of pine needles. Only one pitfall array was employed in this habitat.

A small stream was present at each of the hardwood stands, and a small seepage area in one of the old field sites.

Captures of *S. sexspinosus* indicated strong preference for hardwoods and total avoidance of pine (Fig. 2;  $X^2 = 214.57$ ,  $P < 0.001$ ). Of the 189 specimens trapped at these sites, 156 (83%) were from the hardwood forest sites and 33 (17%) from old field/clearcut sites, with no captures

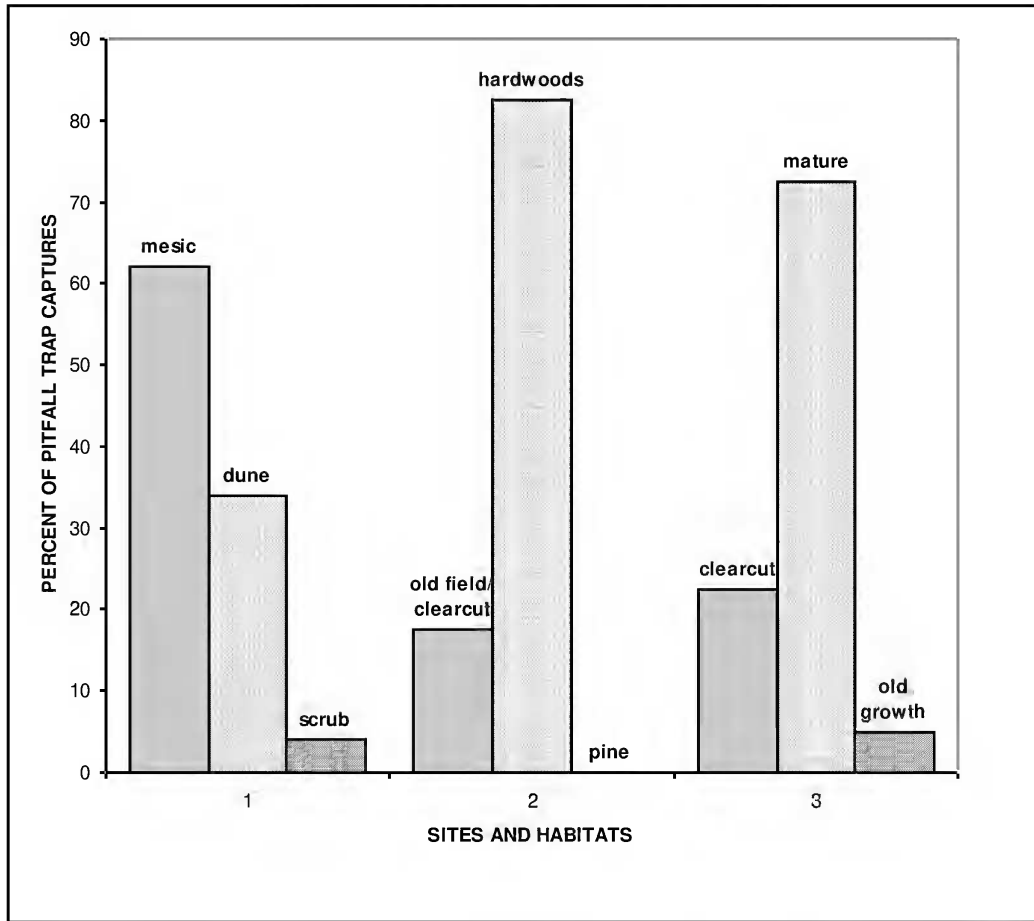


Fig. 2. Pitfall trap captures of *Scolopocryptops sexspinosus* in different habitat types at three study sites: 1. First Landing State Park, City of Virginia Beach (n = 129). 2. Cumberland County (n = 189). 3. Augusta County (n = 40). See text for study site descriptions.

recorded from the loblolly pine forest. All of the old field/clearcut captures were in the southern replicate (i.e., none in the northern replicate).

#### Augusta County

From September 1988 through September 1989, B. R. Flamm operated pitfall-drift fence arrays at 10 sites on Shenandoah Mountain in the George Washington National Forest in an area about 5 miles/8 km west of Stokesville, Augusta Co., Virginia (Flamm, 1990). Three habitat types were sampled: clearcut (2 years postcut), mature forest (mostly red oaks, stand age ca. 70-73 years), and old growth forest (mostly red oaks, stand age  $\geq 138$  years). Of the 40 specimens of *S. sexspinosus* obtained during this study which had associated habitat data, 29 (73%) were captured in mature forests, with a near-total absence (only 2 captures [5%]) from old growth forests (Fig. 2;  $X^2 = 42.12$ ,  $P < 0.001$ ).

#### SEASONALITY

Specimens of *S. sexspinosus* have been captured in Virginia in every month of the year (Fig. 3). Statewide, the combined data for 676 specimens reveals that the peak capture month was July (n = 136, of which 104 were from the Columbia County study sites), with the second highest total in September (n = 92). At least 50 specimens were captured in five other months (March, April, August, October, and November). Not surprisingly, the fewest captures were obtained during December, January, and February, the coldest months of the year.

Comparing the capture data for the three study sites discussed above, there were pronounced differences in seasonal activity patterns associated with the differences in elevation and climate. At First Landing State Park, a coastal site with the mildest climate, specimens were taken year round, with peak collections in March, fewest captures in September and October, and then a slight

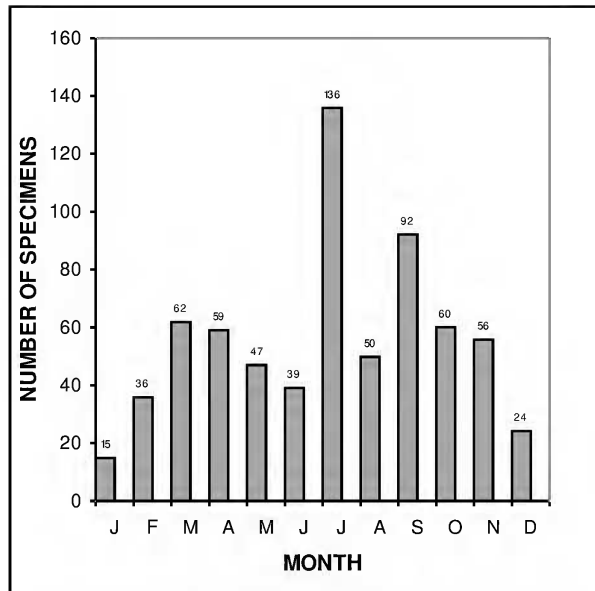


Fig. 3. Seasonal activity of *Scolopocryptops sexspinosus* (n = 676) in Virginia based on collection dates of all available specimens.

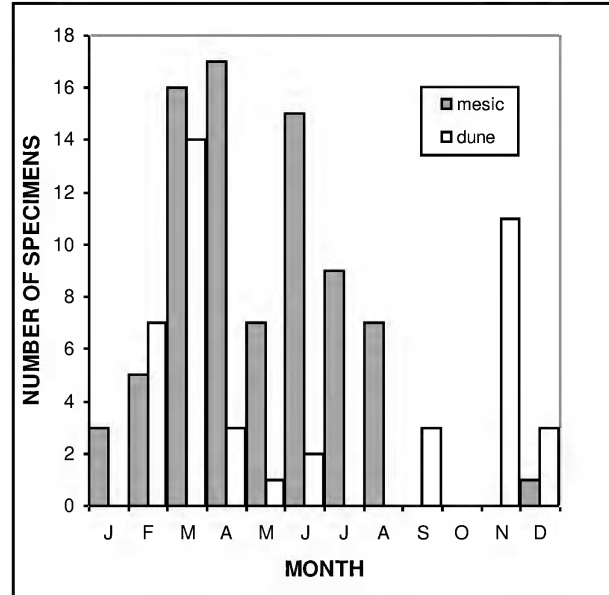


Fig. 5. Seasonal activity of *Scolopocryptops sexspinosus* in two habitats at First Landing State Park, City of Virginia Beach, based on pitfall trap captures (March 1989-May 1990).

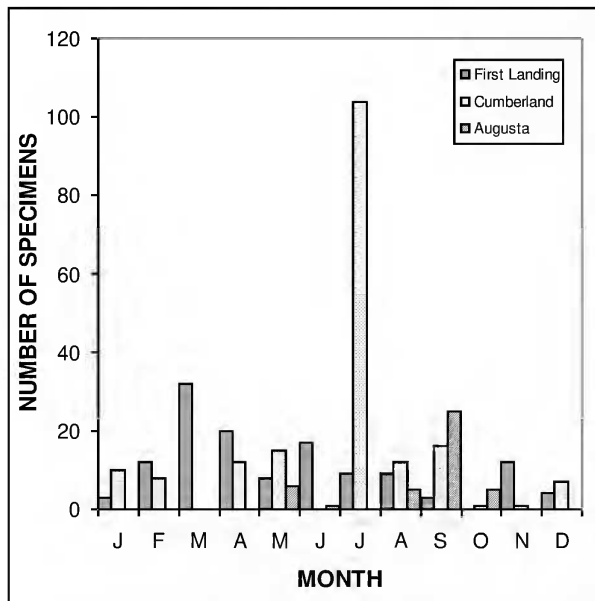


Fig. 4. Seasonal activity of *Scolopocryptops sexspinosus* at three study sites in Virginia based on pitfall trap captures. See text for study site descriptions, locations, and survey dates.

increase in November and December (Fig. 4). The Cumberland County sites are in the Piedmont at elevations of 200-400 feet (60-120 m). At these sites, specimens were captured in most months of the year, but there was a very sharp peak during July, when more than half (56%)

of all specimens were captured (Fig. 4). The Augusta County study sites are in the Ridge and Valley region of Virginia at elevations of 2000-2600 feet (610-793 m), thus experiencing the coldest climate of the three areas under comparison. Here, specimens of *S. sexspinosus* were only captured between June and October, with the peak month being September, when 25 of 42 total specimens (60%) were taken in pitfall traps.

At First Landing State Park, where *S. sexspinosus* predominantly inhabited two of the three rather different biotopes, somewhat different seasonality patterns are evident at a finer scale (Fig. 5). At the mesic site, damp nearly year-round, specimens were trapped from December to August, with a numerical peak in March (16) and April (17). At the dune site, captures made concurrently suggest bimodality, however, with the maximum numbers in March (14) and November (11). Very few (n = 9) were taken between April and mid-October (none in July and August), perhaps reflecting drier summer conditions and less surface activity.

## DISCUSSION AND CONCLUSIONS

As a concluding observation, one set of data (Table 1) potentially raises concern over the impact of ongoing static collecting protocols. From March to December 1989, 100 individuals of *S. sexspinosus* were removed from the population at First Landing State Park, nearly half of which (46) were captured between March and

Table 1. Monthly captures of *Scolopocryptops sexspinosus* in pitfall traps at First Landing State Park, City of Virginia Beach.

| Year | J | F  | M  | A  | M | J  | J | A | S | O | N  | D |
|------|---|----|----|----|---|----|---|---|---|---|----|---|
| 1989 | - | -  | 25 | 14 | 7 | 17 | 9 | 9 | 3 | 0 | 12 | 4 |
| 1990 | 3 | 12 | 7  | 6  | 1 | -  | - | - | - | - | -  | - |

May. Only 14 were taken during those same months the following year, including a single capture in May 1990 when the trapping program was concluded. The absence of *S. sexspinosus* from the numerous pitfall trapping operations conducted elsewhere, and concurrently, in the City of Virginia Beach suggests that this species may survive there as an isolated enclave in First Landing State Park. Perhaps a follow-up sampling program could be designed to monitor the current population without inflicting further depletion.

The results of this study reveal that *S. sexspinosus* is common and widespread in Virginia, but the species appears to exhibit local habitat preferences. Adults are active throughout the year with peak captures statewide recorded during July and September. Local differences in seasonal activity patterns were apparent at selected study sites, presumably due to elevation and climate (temperature) at a broader scale and perhaps moisture gradients at a finer scale.

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